Mark scheme

Chemical energetics

Chemistry 0620 · Questions from Paper 1, Paper 2, Paper 3, Paper 4 an…

Total marks

34

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
1	1	1	1	1	1	5	6	8	9	**34**

Question 1 **[1]**

Answer A

Question 2 **[1]**

Answer A

Question 3 **[1]**

Answer A

Question 4 **[1]**

Answer A

Question 5 **[1]**

Answer B

Question 6 **[1]**

Answer B

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Question 7 [5]

7(a)	decomposing vegetation (second box down ticked).	**1**
7(b)(i)	Experiment 2	**1**
7(b)(ii)	Experiment 1	**1**
7(b)(iii)	label on y-axis – energy (1) reactants on left hand line and products on right hand line on the graph (1)	**2**

Question 8 [6]

8	There are two valid approaches, either measuring time for a set temperature increase OR measuring temperature increase in a set time. *any 6 from*: **MP1** specified/set/measured volume water **MP2** measure (start/initial) temperature (of water) **MP3** volume of water measured using a measuring cylinder or burette or (volumetric) pipette AND **HEAT TO SET TEMPERATURE (change)** **MP4** start timing when heating started / burner put under tube **MP5** heat to set temperature / set temperature rise **MP6** record/measure time taken to heat water **MP7** shortest time is fuel that heats fastest OR **HEAT FOR A SET TIME** **MP4** heat water for a specified time **MP5** measure final temp of water **MP6** calculate temperature rise **MP7** highest temperature (rise) is fuel that heats fastest	**6**

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Question 9 [8]

9 **(a)** **(i)** hydrogen (atoms) replaced by (atoms) of a different element e.g. chlorine [1]
NOT: substitute

(ii) light required [1]

(b) exothermic reaction gives out energy [1]
endothermic reaction absorbs
takes in energy [1]

(c)

bonds broken	energy
C-H	+412
C*l*-C*l*	+242
total energy	+654 [1]

bonds formed	energy
C-C*l*	–338
H-C*l*	–431
total energy	–769 [1]
energy change	–115 [1]

negative sign indicates exothermic [1]

[Total: 8]

Question 10 [9]

10(a)	C_nH_{2n}	**1**
10(b)	orange to colourless	**1**
10(c)	addition	**1**
10(d)(i)	**M1** horizontal line below energy level to right hand side of reactants line and labelled $C_2H_4Br_2$ (1) **M2** activation energy 'hump' with upward arrow **labelled A** from the reactants level (1) **M3** one downward arrow starting from the energy level of the reactants and finishing at the energy level of the products (1)	**3**
10(d)(ii)	**M1** energy needed to break bonds 4 × C–H + C=C + Br–Br = 4 × 410 + 610 + 190 = 2440 (kJ) (1) **M2** energy released in making bonds 4 × C–H + C–C + 2 × C–Br = 4 × 410 + 350 + 2 × 290 = 2570 (kJ) (1) **M3** energy change M1 – M2 = – 130 (kJ / mol) (1)	**3**

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